CLAIMS

What is claimed is:

1. A bone anchor assembly for engagement to an elongated member, comprising:

a receiver member defining an upper opening portion and a lower opening portion each having respective minimum widths, a channel configured to receive the elongated member and communicating with said upper opening portion and said lower opening portion, and a groove around a portion of said lower opening portion;

a crown member movably disposed in said lower opening portion, said crown member including an upper surface and a lower surface;

a bone-engaging anchor having a lower portion configured to engage a bone and a head having a width, said width of said head being smaller than said minimum width of said lower opening portion, said head being movably disposed in said lower opening portion adjacent to said lower surface of said crown member; and

a retaining member defining an aperture smaller than said width of said head, said retaining member at least partially housed in said groove of said receiver member and positioned around said anchor and below said head,

wherein said retaining member prevents removal of said head from said lower opening portion.

2. The assembly of claim 1, wherein said upper opening portion and said lower opening portion form at least part of a single opening through said receiver member.

3. The assembly of claim 2, wherein said receiver member includes two branches which define said upper op ning portion and said channel.

4. The assembly of claim 3, wherein said branches include internal threads.

5. The assembly of claim 4 further including a compression member threadedly connected to said internal threads.

6. The assembly of claim 2, wherein said receiver member defines a chamber that forms at least a part of said lower opening portion, and said crown member being movably disposed within said chamber.

7. The assembly of claim 6, wherein said anchor is a bone screw.

8. The assembly of claim 7, wherein said head of said bone screw is at least partially spherical.

9. The assembly of claim 8, wherein said head of said bone screw includes ridges.

10. The assembly of claim 8, wherein said lower surface of said crown member is at least partially spherical.

11. The assembly of claim 10, wherein said lower surface of said crown member includ s a roughened portion.

12. The assembly of claim 6, wherein said crown member has a width greater than said upper opening portion of said receiver member.

13. The assembly of claim 12, wherein said head of said bone anchor includes a tool-engaging print.

14. The assembly of claim 13, wherein said crown member defines a hole through said upper surface through which said head of said bone anchor can be accessed.

15. The assembly of claim 12, wherein said retaining member is a C-shaped member.

16. The assembly of claim 15, wherein said retaining member has an unloaded outer diameter, said receiver member has a groove diameter, and said unloaded outer diameter of said retaining member is greater than said groove diameter of said receiver member.

17. The assembly of claim 16, wherein said retaining member has a body width, said groove has a groove depth, and said body width is greater than said groove depth.

18. Th assembly of claim 17, wherein said retaining memb r includes an inn r concave surface for engaging said head of said bone anchor.

19. The assembly of claim 18, wherein said inner concave surface forms part of a sphere.

20. The assembly of claim 2, wherein said lower surface of said crown member is b v led.

21. The assembly of claim 2, wherein said lower surface of said crown member is concave.

22. The assembly of claim 2, wherein said crown member has a width greater than said upper opening portion of said receiver member.

23. The assembly of claim 22, wherein said crown member defines a hole through said upper surface through which said head of said bone anchor can be accessed.

24. The assembly of claim 2, wherein said retaining member is a C-shaped member.

25. The assembly of claim 24, wherein said retaining member has an unloaded outer diameter, said receiver member has a groove diameter, and said unloaded outer

diameter of said retaining member is greater than said groove diameter of said receiver m mber.

26. The assembly of claim 24, wherein said retaining member has a body width, said groove has a groove depth, and said body width is greater than said groove depth.

27. The assembly of claim 26, wherein said retaining member includes an inner concave surface for engaging said head of said bone anchor.

28. The assembly of claim 27, wherein said inner concave surface forms part of a sphere.

29. A bone fixation apparatus comprising:

an elongated member configured for placement adjacent and along a length of at least one bone;

a receiver member defining an opening therethrough from a top end to a bottom end, said opening having a lower aperture at said bottom end and an upper aperture at said top end, said receiver member also defining a groove around a portion of said opening, said groove being proximate to said lower aperture, said receiver member further including a channel communicating with said opening and said upper aperture, said channel being configured to receive said elongated member therein;

a crown member insertable through said lower aperture and disposed within said opening, said crown m mber having a lower surface and an opposite upper surface contacting said elongated member;

a bone anchor having a lower portion configured for engaging a bone and a head having a width dimension, said head being insertable through said lower aperture and adjacent to said crown member within said opening of said receiver member;

a retaining member defining an aperture having a width dimension that is less than said width dimension of said head, said retaining member being positioned around a portion of said bone anchor and at least a portion of said retaining member being housed within at least a portion of said groove; and

a compression member engaged within said opening proximate to said upper aperture, said compression member operable to press said elongated member against said crown member, thereby fixing said head of said fastener between said crown member and said retaining member.

30. The apparatus of claim 29, wherein said elongated member is a spinal rod.

31. The apparatus of claim 29, wherein said retaining member is a C-shaped member.

32. The apparatus of claim 31, wherein said retaining member has an unloaded outer diameter, said receiver member has a groove diameter, and said unload d outer

diameter of said retaining member is greater than said groove diameter of said receiver member.

33. The apparatus of claim 32, wherein said retaining member has a body width, said groove has a groove depth, and said body width is greater than said groove depth.

34. The apparatus of claim 33, wherein said retaining member includes an inner concave surface for engaging said head of said bone anchor.

35. The apparatus of claim 34, wherein said inner concave surface forms part of a sphere.

36. The apparatus of claim 29, wherein said crown member defines a hole through said upper surface through which said head of said bone anchor can be accessed.

37. The apparatus of claim 29, wherein said head of said bone anchor is at least partially spherical.

38. The apparatus of claim 37, wherein said lower surface of said crown member is at least partially spherical.

39. An apparatus for receiving and holding components of a multi-axial bone anchor system, comprising a member defining an upper opening portion and a lower opening

portion, a channel transverse to and communicating with said upp r opening portion and said lower opening portion, and a groove around at least a portion of said lower opening portion.

40. The apparatus of claim 39, wherein said upper opening portion and said lower opening portion form at least part of an opening through said member from a top end to a bottom end.

41. The apparatus of claim 39, wherein said groove is proximate said bottom end of said member.

42. The apparatus of claim 40, wherein at least a portion of said upper opening portion is threaded.

43. The apparatus of claim 41, wherein said member includes two branches that define said upper opening portion and at least a portion of said channel.